

US Army Corps  
of Engineers  
Waterways Experiment  
Station

# *The CERCular*

## *Coastal Engineering Research Center*

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## Coastal Engineering Data Retrieval System (CEDRS)

by Doyle L. Jones

19951227 027

### Introduction

Coastal databases are recognized as important support tools for design and maintenance of coastal projects. The Coastal Engineering Data Retrieval System (CEDRS I) was developed to provide convenient microcomputer access to a voluminous database of coastal data to meet these needs for Corps of Engineers offices. CEDRS I consists of a series of individual regional systems containing data applicable to each Corps of Engineers coastal District. This regional approach provides a comprehensive, long-term database of both hindcast and measured data from a number of sources, specifically for the District's area of responsibility.

Each system resides on a microcomputer at the District office and consists of a basic interactive user interface module, unique site-specific information for each region, and a regional database of measured and hindcast wind and wave data. An interface program provides menu-driven data access and complete on-line documentation. A printed Users'

Guide is also provided for all regional databases.

### Pilot Implementation

A pilot version of CEDRS I containing data applicable to the west coast of Florida (Gulf of Mexico) was developed for the Jacksonville District using FORTRAN and sequential ASCII files. This system and all of its supporting files were installed on an auxiliary optical disk drive attached to a 286 microcomputer.

### Current Implementation

Subsequent research and testing resulted in the conversion of the pilot system database to a format consistent with relational database management system (RDBMS) concepts.

Storage medium for the converted system was changed to an auxiliary hard disk to take advantage of technological advances which now provide for very large, very fast hard disks at prices com-

parable to or lower than the cost of optical disks.

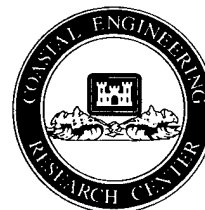
Implementation of RDBMS concepts was accomplished by linking the original CEDRS FORTRAN-based user interface module to a new database created using ORACLE RDBMS software. This implementation has greatly reduced the time required for data access.

### Hardware

CEDRS I is designed to reside on a standard microcomputer now available at Corps of Engineers offices. CEDRS I requires an IBM-compatible AT computer with at least 3 megabytes of memory, a math co-processor, EGA or VGA monitor, one empty slot on the motherboard and MS-DOS/PC-DOS version 4.0 or higher. If more than one external disk drive is being installed, DOS version 5.0 or higher is required. A printer is not required for execution of CEDRS, but is desirable for practical use.

### Software

The interactive CEDRS I driver module is written in FORTRAN, with databases constructed using the ORACLE RDBMS. Linkage to



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Distribution Unlimited

the databases by CEDRS I is coded as Structured Query Language (SQL) instructions. The ORACLE ProFORTRAN precompiler then converts the SQL instructions to FORTRAN statements necessary to access the database. While CEDRS I is in operation, the code languages of FORTRAN and SQL are not apparent to the user and require no special knowledge of languages or special keystrokes.

## ACES Compatibility

One of the primary goals of CEDRS I is to furnish database support for the Coastal Engineering Research Center's (CERC's) Automated Coastal Engineering System (ACES) (Leenknecht and Szuwalski 1992; Leenknecht, Szuwalski, and Sherlock 1992). ACES is a coastal engineering design and analysis system which provides a full range of computer tools for increasing the accuracy, reliability, and cost-effectiveness of Corps coastal engineering endeavors. Initial development of the ACES library of computer-based tools and its continued expansion and evolution have been guided by a committee of Corps coastal experts. ACES is in use Corps-wide as well as in the private sector. CEDRS I development efforts have closely followed ACES design principles both in software and hardware elements; and continued coordination is ensured for the future.

## Hindcast Data

The CEDRS I databases contain both measured data from several sources and computer-model-generated hindcast data. At the present time CEDRS I contains only wind and wave data.

Each CEDRS I database contains appropriate regional data

from the Wave Information Study (WIS) for more than 700 locations along the U.S. coastlines. These data are a time series produced by the WIS wave hindcast model, WISWAVE 2.0. For the Atlantic Ocean, Pacific Ocean, and the Gulf of Mexico the period of record is 20 years (1956-1975). For the Great Lakes, a 32-year period (1956-1987) was used for the hindcast. Parameters stored in CEDRS I for WIS data are consistent with WIS Standard Hindcast Data Format. The WIS references at the end of this article provide a complete description of WIS parameters and formats.

The WIS hindcasts contain data recorded every 3 hr for either a 20-year or 32-year period (58,440 or 93,504 records per station, respectively). Data storage requirements for individual CEDRS I regions range from 600 to 2,000 megabytes.

In addition to WIS wave and wind parameter data, tables of basic statistics, which were calculated using the total time series, are available for each station. Since WIS conducted separate hindcasts for Gulf of Mexico and Atlantic coast hurricanes, the tables of statistics from these hurricanes were also generated separately.

## Measured Data

In addition to hindcast values, the databases contain measurements as described below.

- CERC Field Wave Gage Program (FWGP). The FWGP includes the California Coastal Data Information Program (Scripps) (*Coastal Data Information Program, Monthly Reports*), the Florida Coastal Data Network (*University of Florida Coastal Data Network, Wave Data Report*),

and other CERC site-specific measured data sets. Measurements are usually recorded at 6-hr intervals, using various devices such as buoys, pressure devices, and current meters.

- National Oceanic and Atmospheric Administration (NOAA). The NOAA data set includes data from a network of moored buoys operated by the National Data Buoy Center (NDBC) since the 1970's (NDBC 1989), and from stations of the Coastal-Marine Automated Network (C-MAN) which became operational in March 1983. For CEDRS I, only winds and waves (height/period/direction) from this voluminous meteorological data set have been extracted. Early records were made every 3 hr but most of the more recent data is recorded hourly.

## Visual Data

The Littoral Environment Observation System (LEO) was established in 1968, and observations have been made at more than 200 sites along the coasts of the United States (Sherlock and Szuwalski 1987). The LEO system uses trained observers to obtain daily visual observations of such coastal variables as breaker height, wave period, direction of wave approach, wind speed and direction, longshore current velocity, and beach slope. Observers have obtained this data using simple, inexpensive equipment and for some data, e.g., wave height and direction, observers are asked to simply record a visual estimate. Observations are made either one or two times per day. These data should be used with caution.

## User Options

The user has seven options during the operation of CEDRS I:

- Draw a map of the region
- Display the exact location of the stations
- Extract all or part of a time series
- Display an x-y plot of data
- Display precomputed statistics
- Display hurricane data
- Exit to DOS

Option 1 allows the user to display one or more maps of the region of interest showing the approximate locations of the hindcast or measured stations.

Option 2 lists the exact latitude and longitude of the stations within a region of interest, along with the water depth of the station and the period of data availability.

Option 3 allows the user to extract data from CEDRS I and write it to an external file. The user has control over the type of data extracted, the number of stations, the time interval of interest, and the data destination. Data may be extracted for intervals of one month, six months, one year or several years. The size of the extracted file may be very large, depending upon the period selected. Measured data may not be continuous; CEDRS I indicates the gaps that occur in the measured data. This data may be used as input for a numerical model, imported into a spreadsheet, used as input for an ACES module, or as input to some other user-designed process. The data may be extracted as SI (metric) or common English units.

Option 4 allows the user to produce x-y plots of various parameters. Plotting of data requires

user input very similar to that of option 3.

Option 5 provides the user with precomputed basic statistics derived from the WIS hindcast. Options include percent occurrence of wave height and period by direction, mean wave height by month and year, maximum wave height by month and year, 20-year summary statistics (32-year summary for the Great Lakes) and return period tables.

Option 6 provides hurricane data for the Gulf of Mexico and the Atlantic coast from separate WIS hindcasts. Options include maximum wave height with associated wave period and wave direction, return periods by station, and track maps of hurricanes that occurred during the hindcast period.

Option 7 allows the user to exit the program.

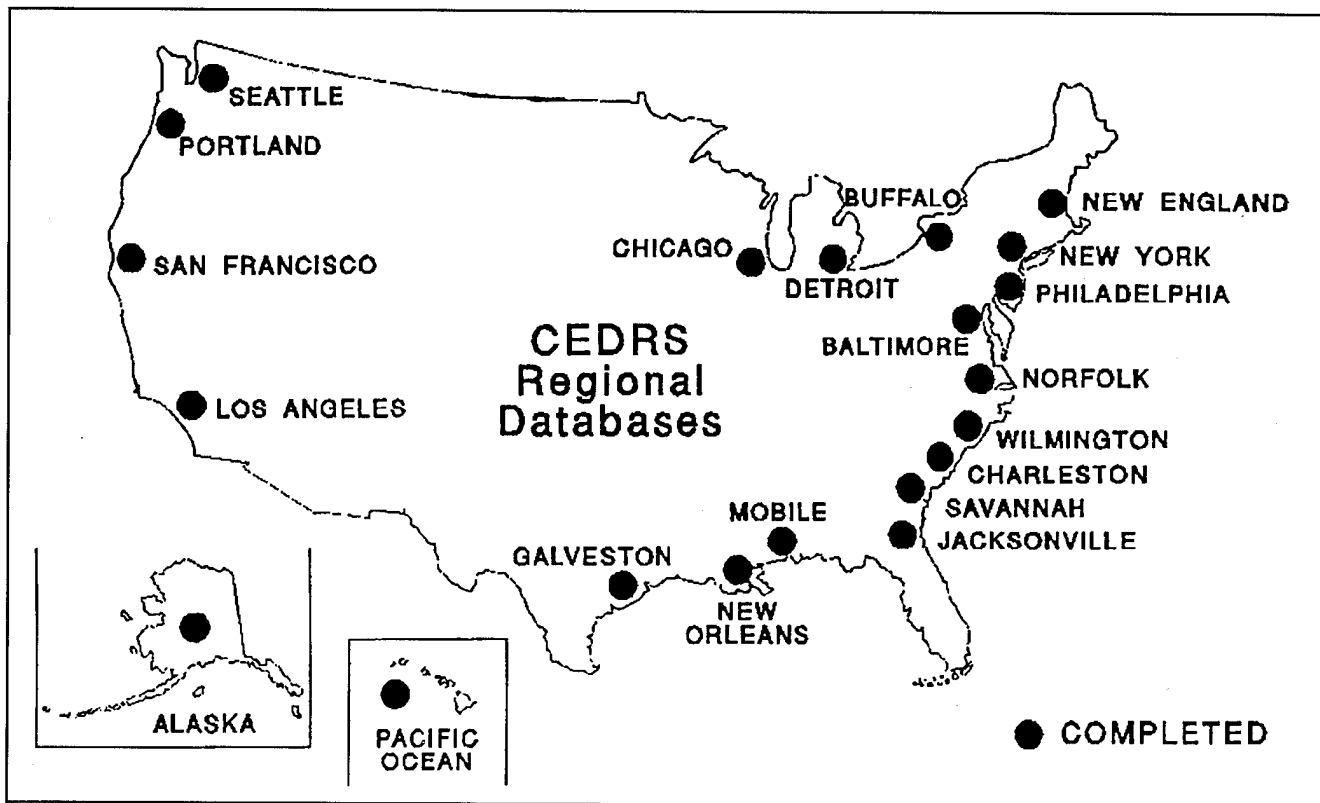


Figure 1. CEDRS I database sites for the Corps of Engineers

## Availability

The CEDRS I database system is available for District Corps of Engineers offices only. Data requests from outside the Corps of Engineers should be directed to appropriate Corps of Engineer offices.

Data contained in CEDRS I are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products by the United States government.

## CEDRS II

CEDRS II is now available to users who have access to the Internet using a World Wide Web (WWW) browser such as Netscape or Mosaic and anonymous FTP. Availability of data and instructions to access the data may be found at Uniform Resource Locator (URL) address [http://bigfoot.cerc.wes.army.mil/CERC\\_homepage.html](http://bigfoot.cerc.wes.army.mil/CERC_homepage.html).

Select the "Wind and Wave Data" link and follow the directions.

Please note that URL addresses are case sensitive.

Users who do not have access to a WWW browser may obtain instructions by accessing anonymous ftp site 134.164.160.40 and following the directions in file README.NOW found in the pub/atl, pub/gul, pub/pac, or pub/lak directories.

### Example FTP Session

ftp 134.164.156.16
user: anonymous
password: (your e-mail address)
cd pub/atl
get README.NOW
quit

CEDRS II includes wind and wave data from original sources measured since the distribution of CEDRS I. Data in CEDRS II are stored in both the ZIP format for MS-DOS users and compressed format for UNIX users to facilitate accessibility. Additional WIS hindcast data for the Atlantic coast will become available as CEDRS II evolves, and users should monitor the URL or anonymous FTP site mentioned in the previous section for news of these additions and modifications.

## Additional Information

Questions relating to CEDRS I or CEDRS II should be directed to the following Internet address: [WEBMASTER@COAFS1.WES.ARMY.MIL](mailto:WEBMASTER@COAFS1.WES.ARMY.MIL)

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**Mr. Doyle L. Jones** is a Physical Scientist in the Research Division of CERC. He earned a B.S. degree in chemistry from Mississippi College and an M.C.S. in chemistry and physics from the University of Mississippi. Since joining CERC in 1984, he has worked primarily on the Microcomputer Applications for Coastal Engineering (MACE) library and the Coastal Engineering Management Information System (CEMIS).

## Winds for Wave & Surge Estimation

A workshop on Winds for Wave & Surge Estimation was conducted at the U.S. Army Engineer Waterways Experiment Station on 29-31 August 1995. Eight attendees from Corps of Engineers District offices participated. The workshop objective was to present Corps of Engineers technology for estimating winds in applications ranging from simple reconnaissance level studies to comprehensive modeling studies. Products developed in the nearly completed Coastal Research Program work unit "Wind Estimation for Coastal Modeling" were highlighted. The workshop was the work unit's final technology transfer milestone. POC on the workshop is Dr. Edward F. Thompson, (601) 634-2027, FAX (601) 634-4314, Internet: e.thompson@cerc.wes.army.mil.

## IAMAS/IAPSO Joint Assembly

A joint assembly of the International Association for the Physical Sciences of the Oceans (IAPSO) and the International Association of Meteorology and Atmospheric Sciences (IAMAS) will be held at the World Congress Centre in Melbourne, Australia, on July 1-9, 1997. In addition, there will be a symposium sponsored by the Tsunami Commission of the International Union of Geodesy and Geophysics (IUGG), and symposia sponsored by other IUGG

Associations. Individuals interested in attending may obtain preliminary information from:

IAMAS/IAPSO Secretariat  
Convention Network  
224 Rouse Street  
Port Melbourne, Victoria 3207  
AUSTRALIA  
Telephone: 61 3 9646 4122  
FAX: 61 3 9646 7737  
E-mail: mscarlett@peg.apc.org

A listing of Symposia, and a call for papers, will be available at a later date.

## Symposium honors Douglas Inman

A Symposium at the American Shore and Beach Preservation Association National Conference on November 15-17, 1995, will honor Dr. Douglas Inman as the "Pioneer of the Nearshore." The Symposium, on November 16, will be held at the

U.S. Grant Hotel in San Diego, California, and will include nine speakers. There will also be a reception the evening of November 15 at the Stephen Birch Aquarium Museum at Scripps Institution of Oceanography.

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# CERC Conference Rooms Named

Dean Morrough P. O'Brien, Prof. Robert L. Wiegel, and Mr. Thorndike Saville, Jr., were recently honored at the Coastal Engineering Research Center (CERC) for their significant contributions to both CERC and the entire coastal engineering community. The three conference rooms at CERC will now be named in honor of these three distinguished engineers.

During ceremonies honoring the three distinguished coastal engineers, gold-framed plaques with pictures of the three individuals and descriptions of their contributions to the field of coastal engineering were presented and placed in the conference rooms. All persons using the conference rooms will now be informed of the contributions that O'Brien, Wiegel, and Saville have made to the field of coastal engineering.

O'Brien, Wiegel, and Saville were honored for their great contributions in the area of education and in the promotion of scientific understanding and commercial application of the principles of coastal engineering. Dean O'Brien and Prof. Wiegel served as members of the Coastal Engineering Research Board (CERB), and Mr. Saville served as Technical Director of CERC. In addition, both Wiegel and Saville served on active duty in the armed forces from 1942-1946. Mr. Saville's contributions to CERC as a hydraulic engineer range from 1953-1981, including being Branch Chief of the Special Projects Branch (1957-1963), Chief of the Research Division (1964-1971), and Technical Director of CERC from 1971 until his retirement in 1981. Morrough



*From left to right: J. Bailey Smith reading dedication; Edith M. Caples holding plaque honoring Mr. Saville; William R. Curtis, Jr., holding plaque honoring Prof. Wiegel; and Robin Hoban holding plaque honoring Dean O'Brien*

O'Brien was a member of the Army Scientific Advisory Panel (1954-1965) and the Defense Science Board (1961-1965), in addition to serving on the CERB and the Beach Erosion Board, and was a consultant to the Board on Sand Movement and Beach Erosion in 1929.

Robert Wiegel was elected President of the American Shore and Beach Preservation Association, Fellow of the American Association for the Advancement of Science, and Honorary Member of the American Society of Civil Engineers. Dr. Wiegel also served as General Chairman for seven International Conferences of Coastal Engineering. Thorndike Saville, Jr., was elected vice president of the American Shore and Beach Preservation Association, to the

National Academy of Engineering, and has served as a member of the Coastal Engineering Research Council, which organizes the International Conference on Coastal Engineering. Mr. Saville is also still professionally active in the American Society of Civil Engineers, the American Shore and Beach Preservation Association, and serves as a U.S. member of Permanent Technical Committee II of the Permanent International Association of Navigation Congresses.

During their next visit to CERC, readers are encouraged to take a moment to familiarize themselves with the new conference room names and to read the plaques about the scientific contributions of Morrough P. O'Brien, Robert L. Wiegel, and Thorndike Saville, Jr.

# Young Scholars Program

Forty-four high school students from six states were selected to participate in the 1995 National Science Foundation Young Scholars Program on coastal erosion and preservation at McNeese State University, Lake Charles, Louisiana. Students were chosen on the basis of grades, an essay, their awards and accomplishments in high school, and letters of recommendation from science and math teachers. The students were divided into two sessions for the program.

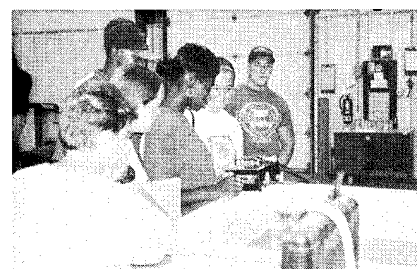
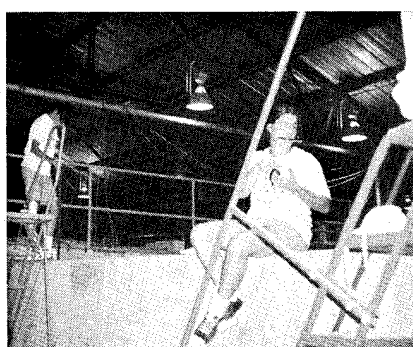
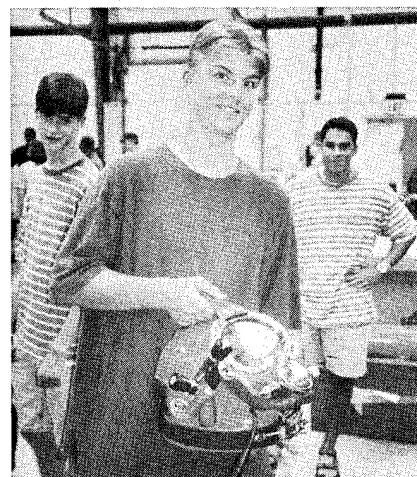
Each group of Young Scholars spent three weeks studying

coastal engineering and shoreline preservation. During the second week, they spent three days at the U.S. Army Engineer Waterways Experiment Station's Coastal Engineering Research Center (CERC), where they attended lectures and demonstrations of laboratory and numerical models by CERC engineers and scientists. The students also collected wave data in a laboratory flume and performed PC data analysis.

As part of the program, each student designed a model of a device to prevent coastal erosion and tested the model in a wave

flume. Holly Beach and Constance Beach, Louisiana, on the Gulf of Mexico, served as an outdoor laboratory. Students observed attempts at coastal preservation, and measured the rate of erosion by surveying the beach line.

An award was given to the top Young Scholar in each session. Additional information on the program may be obtained from Mary Richardson, Project Director, McNeese State University at (318) 475-5123.



## Coastal Engineering Education Program

The next session of the Coastal Engineering Education Program (CEEP) will be held during the 1996-97 academic year starting in August 1996 and ending in August 1997. The CEEP is a one-year program that allows participants to earn a Master of Engineering degree with a concentration of courses in coastal engineering. Students may alternatively enroll in the Master of Science degree program which has slightly different requirements.

The CEEP is offered through the WES Graduate Institute jointly by Texas A&M University (TAMU) and CERC. The first semester is in residence at TAMU, and the second semester and following summer are at CERC. Applicants must have an acceptable score on the Graduate Record Examination and be admitted to Texas A&M University in order to participate in the CEEP. International students are required to take the TOFEL exam and obtain an acceptable

score. Action to meet these requirements should be initiated as soon as possible.

For more information contact Dr. C. H. Pennington, Director, WES Graduate Institute, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, telephone (601) 634-3549, FAX (601) 634-4180, or either Dr. Billy L. Edge or Dr. Robert E. Randall, Ocean Engineering Program, Texas A&M University, College Station, TX 77843-3136, telephone (409) 847-8712 or 845-4515, FAX (409) 862-1542.



## Election to Office

Dr. Fred E. Camfield, a Research Hydraulic Engineer at the Coastal Engineering Research Center, was elected to an eight-year term as Secretary General of the International Association for the Physical Sciences of the Oceans (IAPSO) at the Association's business meeting on August 11, held in conjunction with the IAPSO General Assembly in Honolulu. Dr. Camfield was the convener for the symposium, "Coastal

Ocean (B) - Interaction with the Adjacent Land," at the recent IAPSO General Assembly, and has served as a member of the Tsunami Commission of the International Union of Geodesy and Geophysics since 1983. He also served as President of the Tsunami Society from 1991-1995, as a member and chairman of the Wave and Wave Forces technical committee of the American Society of Civil Engineers, and on the

Publications Committee of the *Journal of Waterway, Port, Coastal and Ocean Engineering*. Dr. Camfield has been at CERC since 1975, and was previously employed as a faculty member at the University of Delaware with a joint appointment in the Colleges of Engineering and Marine Studies, as a research associate at Oregon State University, and as an acting assistant professor at Stanford University.

## New E-mail Address

The Coastal Engineering Research Center (CERC) has changed to a new E-mail address. During an interim period, E-mail sent to old addresses will be forwarded to the new address. The new address has the form

<first initial>.<last name>@  
cerc.wes.army.mil

As an example, E-mail sent to Dr. James R. Houston, Director of CERC should be addressed to:

j.houston@cerc.wes.army.mil

E-mail sent to Charles C. Calhoun, Jr., Assistant Director of CERC, should be addressed to:

c.calhoun@cerc.wes.army.mil

and mail sent to the editor of the CERCular should be addressed to:

f.camfield@cerc.wes.army.mil

The few exceptions to the above occur when personnel with the same last name have the

same initial. In those circumstances, two initials are used as follows:

J. Bailey Smith is  
jb.smith@cerc.wes.army.mil

Jane M. Smith is  
jm.smith@cerc.wes.army.mil

S. Jarrell Smith is  
sj.smith@cerc.wes.army.mil

Julie D. Rosati is  
jd.rosati@cerc.wes.army.mil

## Publications of Interest

The following publications are available from the sources indicated. They are not available from CERC.

*Sea Cliffs, Beaches, and Coastal Valleys of San Diego County - Some Amazing Histories and Some Horrifying Implications*, 193 pages, paperback edition, 1991, \$15. Copies available from University of California Press, Berkeley, CA 94720.

*The Eroding Shores of Outer Cape Cod*, WHOI-G-94-001,

15 pages, reprinted in 1994, free, supplies are limited. Copies available from WHOI Sea Grant Program, CRL209, Woods Hole, MA 02543.

*Vegetated Buffers in the Coastal Zone: A Summary Review and Bibliography*, RIU-T-94-001, P1333, 71 pages, 1994, \$7; and *Environmental Guide for Marinas: Controlling Nonpoint Source and Storm Water Pollution in Rhode Island*, RIU-H-94-002, P1374, 155 pages, 1994, \$10. Copies available from

Rhode Island Sea Grant, University of Rhode Island, Bay Campus, Narragansett, RI 02882-1197.

*Preventing Failure in Mooring Systems*, MITSG-94-19, 7 pages, 1994, \$2 plus \$1 per order for shipping and handling. Copies available from Publications, Sea Grant Program, Massachusetts Institute of Technology, 77 Massachusetts Ave., E38-368, Cambridge, MA 02139.

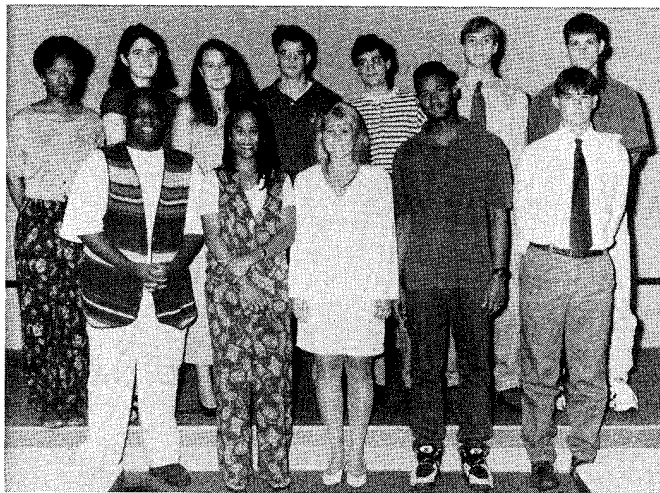


# Calendar of Coastal Events of Interest

- Oct 26 - 28, 1995      **Estuarine and Coastal Modeling Conference**, San Diego, California,  
POC: Malcolm Spaulding, (401) 792-2537, FAX (401) 789-1932
- Oct 29 - Nov 2, 1995      **ECOSET '95**, 6th International Conference on Aquatic Habitat Enhancement,  
Tokyo, Japan, POC: FAX 81-3-3667-7174
- Nov 12 - 16, 1995      **Estuarine Research Federation Conference**, Marriott Bayfront, Corpus Christi, Texas,  
POC: Mary Garrett & Assoc., (512) 888-5400, FAX (512) 888-7401
- Nov 13 - 18, 1995      **Third Seminar on Ports and Inland Waterways**, Hotel Cidade de Goa Beach Resort,  
Goa, India, POC: PIANC-PCDC Seminar, 32-2-208-5216/18, FAX: 32-2-208-5215
- Nov 14 - 17, 1995      **14th World Dredging Congress**, Amsterdam, The Netherlands
- Nov 15-17, 1995      **The Coast - Policy, Economics & Recreation**, American Shore and Beach  
Preservation Association, includes Symposium honoring Douglas Inman,  
U.S. Grant Hotel, San Diego, California, POC: FAX: (916) 322-1831,  
E-mail: ksterrett@ucsd.edu
- Dec 11 - 15, 1995      **American Geophysical Union Fall Meeting**, San Francisco, CA,  
Ocean Sciences POC: Mark E. Luther, (813) 893-9528, E-mail: luther@marine.usf.edu
- Jan 24 - 26, 1996      **9th Conference on Beach Preservation Technology**, St. Petersburg Hilton,  
St. Petersburg, Florida, POC: David Tait, (904) 222-7677, FAX (904) 561-1172
- Feb 12 - 16, 1996      **AGU/ASLOS Ocean Sciences Meeting**, San Diego, California,  
POC: Dr. Suzette Kimball, (404) 331-4916, FAX (404) 331-4943,  
E-mail: suzette\_kimball@nps.gov
- Apr 1 - 2, 1996      **Tsunami 1996**, Hilo, Hawaii, POC: E-Mail: gcurtis@uhunix.uhcc.hawaii.edu
- May 6 - 9, 1996      **Offshore Technology Conference**, Houston, Texas, FAX (214) 952-9435,  
E-Mail: tech-prog@spelink.spe.org
- Jul 21 - 26, 1996      **Hazards '96**, Toronto, Canada, POC: M. I. El-Sabh, FAX: (418) 724-1842,  
E-mail: mohammed\_el\_sabh@uqar.quebec.ca
- Aug 12 - 17, 1996      **Coastal Zone Canada '96**, Rimouski, Quebec, Canada, POC: M. I. El-Sabh,  
FAX: (418) 724-1842, E-mail: mohammed\_el\_sabh@uqar.quebec.ca
- Sep 1 - 6, 1996      **25th International Conference on Coastal Engineering**, Peabody Hotel, Orlando,  
Florida, POC: ICCE '96, (512) 994-2376, FAX: (512) 994-2715,  
Internet: icce96@cbl.tamucc.edu



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**Science and Engineering Apprentice Program.** As part of the Science and Engineering Apprentice Program, CERC hosted five of the thirteen students at WES this summer. The program, administered through George Washington University, allows high school students to work under the mentorship of a scientist or engineer for 8 weeks during the summer. The students conduct research on a particular project, and at the end of the summer write a paper about their work. A competition is held at WES and the top two students selected present their papers at George Washington University with approximately 700 other participants in the program. The projects for CERC this summer included: "Analysis and Comparison of High-Density Bathymetric Data to Conventional Profile Line Survey Techniques" by Wesley McCleese, "Potential Candidates for Jetty Spur Improvements" by David Curtis, "The Development of Assets Database for Oil spill Contingency Planning and Recovery Operations" by Amy Welch, "Analysis of Continental Shelf Vibracores Taken at Ocean City, Maryland" by Donald Erves, and "Selective Placement of Quarystone Armor Units" by Dynisha Hayes.



## The CERCular Coastal Engineering Research Center

This bulletin is published in accordance with AR 25-30 as an information dissemination function of the U.S. Army Engineer Waterways Experiment Station. The publication is part of the technology transfer mission of CERC. Results from ongoing research programs will be presented. Special emphasis will be placed on articles relating to application of research results or technology to specific project needs. Contributions of pertinent information are solicited from all sources and will be considered for publication. Communications are welcomed and should be addressed to the Coastal Engineering Research Center, ATTN: Dr. Fred E. Camfield, U.S. Army Engineer Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, or call (601) 634-2012, FAX (601) 634-3433. Internet: f.camfield@cerc.wes.army.mil.

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